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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Trung T. Doan et al.

Serial No.: 10/774,762

Filed: February 9, 2004

For: APPROACH TO AVOID BUCKLING
BPSG BY AN INTERMEDIATE
BARRIER LAYER

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Group Art Unit: 2822

Examiner: Novacek, Christy L.

Atty. Docket: MCRO:144-3/FLE
92-0321.04

Assistant Commissioner
for Patents
Washington, D.C. 20231

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July 5, 2007

Date

Toni Hill

Sir:

REPLY BRIEF PURSUANT TO 37 C.F.R. § 41.41

This Reply Brief is being filed in response to the Examiner's Answer mailed on May 4, 2007. This Reply Brief addresses the Examiner's misinterpretation of the rejected claims, as well as the Examiner's misinterpretation of the prior art. Specifically, this Reply Brief addresses certain comments made by the Examiner in the "Response to Argument" set forth in Section 10 (pages 10-13) of the Examiner's Answer.

Rejection of Claims 19-38 under 35 U.S.C. 102(e)

The Examiner has completely mischaracterized the claims as product-by-process claims.

The Examiner asserts that the present independent claims 19 and 33 are product-by-process claims. In support of this position, the Examiner points out that the claimed invention is a “device” and that Appellants’ claims are “drawn to a process of making” a device. Examiner’s Answer, p. 10. The Examiner is absolutely right when she states that “the claimed invention is a semiconductor device.” *Id.* (Emphasis in original). Specifically, all elements of independent claims 19 and 33 are structural elements such as a “first planarization layer”, “a barrier film”, and “a semiconductor substrate,” each described with certain structural and/or physical characteristics. However, these claims are not product-by-process claims as the Examiner has asserted. A product-by-process claim is “a product claim that defines the claimed product in terms of the process by which it is made.” M.P.E.P. § 2173.05(p). Further, a product-by-process claim defines a product by laying out the method steps required to produce the product. *See Atlantic Thermoplastics Co. Inc. v. Faytex Corp.*, 23 U.S.P.Q.2d 1481, 1490 (Fed. Cir. 1992). These claims do not lay out the method steps required to produce a product, but rather describe structural and/or physical characteristics of the device itself. Thus, the Examiner has incorrectly interpreted the claims as product-by-process claims and, as a result, the Examiner has ignored structural and/or physical characteristics of the claimed device.

In the Appeal Brief, Appellants argued that certain claimed physical or structural characteristics present in independent claims 19, 26, and 33 distinguished the claimed subject matter over the prior art. In the Examiner’s Answer, those characteristics were disregarded as process limitations. *See* Examiner’s Answer, p. 10-11. Since independent claims 19, 26, and 33

are not product-by-process claims as discussed above, the Examiner *must* consider these structural and/or physical characteristics.

Woo does not disclose layers having different thermal coefficients of expansion or reflow temperatures.

To further clarify Appellant's argument from the Appeal Brief, claims 19, 26, and 33 all recite a first and second thermal coefficients of expansion and first and second reflow temperatures in reference to the first and second planarization layers, respectively. The Examiner has stated that a thermal coefficient of expansion would be inherent to a layer made of that material. Examiner's Answer, p. 4. Even if a thermal coefficient of expansion or a reflow temperature is inherent to a layer, the Woo reference does not disclose layers with different thermal coefficients of expansion or reflow temperatures. Indeed, to the extent that the Examiner has relied upon the disclosure of two layers of borophosphosilicate glass in Woo, these layers must be considered as having the *same* physical characteristics since Woo does not distinguish between these layers. Because the Woo reference does not disclose every element of independent claims 19, 26, and 33, it cannot anticipate the claims. Accordingly, Appellants respectfully request that the Board withdraw this rejection and allow independent claims 19, 26, and 33 and their dependent claims.

The Examiner has completely ignored Appellants' argument that the Examiner's rationale for the inherency of flowable layers is fundamentally flawed.

In the Final Office Action, the Examiner rejected claim 26 alleging the layers recited would be inherently flowable. Specifically, the Examiner stated conclusively and subjectively

that the “[f]lowability of the layers is an inherent property of the material of the layers.”

Examiner’s Answer, p. 10. In response, Appellants argued that “flowable layers” are not inherent to the material of the layers. *See* Appeal Brief, p.12-14. The ability to flow is not simply a function of the layers being made of borophosphosilicate glass, for example. Notably, factors other than the mere presence of certain materials in a layer significantly contribute to the capacity of a layer to flow. *Id.* These factors include the *concentration* of boron and phosphorous in the glass and the *film thickness* which governs the capacity of resist to planarize, i.e. flow from high points to low points. *Id.* at 13. Support for the argument was supplied by cited portions of Silicon Processing for the VLSI Era, and was included as an appendix to the Appeal Brief. The Examiner’s Answer merely restated the original rejection, completely ignoring Appellant’s argument and cited reference traversing the rejection. As specified in the M.P.E.P., “[w]here the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it.” M.P.E.P. § 707.07(f). Appellants respectfully assert that the Examiner has failed to answer Appellants’ argument.

In addition, because the Examiner’s rationale is only based on her subjective statement as noted above, the Examiner has not provided a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art. If the Examiner believes the limitation to be inherent in the cited reference, then the Examiner “must provide some evidence or scientific reasoning to establish the reasonableness of the examiner’s belief that the functional limitation is an inherent characteristic of the prior art.” *Ex parte Skinner*, 2 U.S.P.Q.2d 1788, 1789 (Bd. Pat. App. &

Inter. 1986). Even to the extent that the Examiner has met this burden, Appellants respectfully assert that they have produced evidence that contradicts the Examiner's assertion. *See* Appeal Brief, p. 12-14. Thus, Appellants respectfully request that the Board withdraw the rejections under 35 U.S.C. § 102 and allow independent claim 26 and its dependent claims.

Rejection of Claims 39-42 under 35 U.S.C. 103(a)

The Examiner has completely ignored Appellants' argument of that the cited reference is missing features recited by independent claim 39.

The Examiner rejected independent claim 39 under 35 U.S.C. § 103(a) as obvious over Woo in view of the Cheung reference. The Examiner relies on the conclusory statement that "the layers disclosed by Woo would appear to inherently be in a reflow state." Examiner's answer, p. 12. Again, the Examiner has completely ignored Appellants' arguments by merely restating his argument from the Final Office Action. As clearly pointed out in the Appeal Brief, 1) Neither Cheung nor Woo disclose any layers in a reflow state and 2) Cheung only discloses a heat pulse in the claimed temperature range for 10 to 20 seconds, permitting "a reaction to occur forming the metal silicide," which is distinctly different from a layer in a reflow state. *See* Appeal Brief, p. 18.

Claim 39 specifically recites a first and second "layer being *in* a reflow state." The claim is therefore an intermediate device in the process of being made. In order for either reference to render this claim obvious, a disclosure would need to be made of such an intermediate device. While Cheung discloses a heat pulse in the claimed temperature range for 10 to 20 seconds, this does not produce a layer in the reflow state. As one skilled in the art will recognize, the methods

recited by the application require several minutes at high temperatures to prepare a layer in the reflow state. *See* Application, p. 8. The heat pulse relied upon by the Examiner would not produce a layer in the reflow state. Therefore, neither reference discloses any layer in the reflow state. Thus, the Examiner has not established a *prima facie* case for obviousness because not every claimed element has been disclosed in the prior art. Therefore, Appellants respectfully request that the Board withdraw the rejections under 35 U.S.C. § 103 and allow independent claim 39 and its dependent claims.

Conclusion

In view of the remarks set forth in the Appeal Brief, and further in view of the above remarks, Appellants respectfully submit that the Examiner has failed to demonstrate that the subject matter of claims 19-38 is rendered anticipated under 35 U.S.C. § 102(e). Likewise, Appellants respectfully submit that the Examiner has failed to demonstrate that the subject matter of claims 39-42 is rendered obvious under 35 U.S.C. § 103(a). Accordingly, Appellants respectfully request that the Board withdraw this rejection and allow claims 19-42.

Respectfully submitted,

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